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# CMIP6 projections indicate more erosive events across Australia

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**Abstract:** Rainfall erosivity is a critical factor in the erosion process and is expected to be significantly impacted by climate change. For instance, the increased soil erosion caused by high rainfall erosivity can exacerbate land degradation and desertification. Moreover, the erosion of topsoil and the subsequent loss of soil organic matter can lead to reduced soil fertility and productivity, reducing the ability of soils to support food production and ecosystem services.

In this study, we investigate the impacts of climate change on rainfall erosivity in Australia using NASA daily global downscaled CMIP6 data at 0.25 degree resolution. We conduct a comparative analysis of two Shared Socioeconomic Pathways (SSPs), SSP2-4.5 and SSP5-8.5 from historical (1995-2014), 2050s (2040-2060) and 2090s (2080-2100), utilizing data from 35 General Circulation Models (GCMs). Historical SILO rainfall data were applied for model validation.

Corresponding to a rising trend in the precipitation, the rainfall erosivity shows an increase trend during 2015–2100 under both the SSP2-4.5 and SSP5-8.5 scenarios. In particular, the precipitation would increase rapidly from early 2040s to the end of 21 century under the SSP5-8.5 scenario, leading to an obvious growth erosive rainfall events in Australia. Relative to that in the present day (1995–2014), the highest increase is projected to occur under SSP5-8.5, with an average increase of 19% by the end of the century, compared to the baseline period (1995-2014). The increase in rainfall erosivity is more moderate under SSP2-4.5, with an average increase of 12%. However, the magnitude of the increase varies significantly across regions, with the largest increase projected for South East Australia, South and South West Australia.

In conclusion, this study emphasizes the critical role of rainfall erosivity in the erosion process and its significant impacts under climate change. Our findings provide insights into the spatial and temporal variations in rainfall erosivity under different climate scenarios, contributing to a better understanding of the complex relationship between climate change and soil erosion. The use of NASA daily downscaled CMIP6 data, along with a comparative analysis of SSP2-4.5 and SSP5-8.5 scenarios, enhances the understanding of the potential impacts of climate change on rainfall erosivity at a continental scale.

***Keywords:*** *Rainfall erosivity, climate change, soil erosion, downscaled CMIP6, general circulation models*